

AMENDMENTS TO THE DRAWINGS

The attached sheet(s) of drawings includes changes to Figure 1 and Figure 4B. Please correct figure 1 by eliminating numeral 9 and numeral 15. Also correct, figure 4B by changing capital P sub capital F, to capital P sub capital E.

Attachment: Replacement sheet
 Annotated sheet showing changes

REMARKS

The drawings have been objected to for the reasons set forth on page 2 of the Examiner's Office Action letter. As the Examiner will note, figure 1 has been amended to eliminate elements 9 and 15 which were deemed unnecessary and figure 4B has been amended to correct "PF" to "PE". Accordingly, it is believed that the objections to the drawings have been eliminated.

The disclosure has been objected to for the reasons set forth at the top of page 3 of the Examiners Office Action letter. As the Examiner will note, the specification has been amended to make the necessary corrections suggested by the Examiner and accordingly, it is believed that the objection has been eliminated.

Claims 1 and 2 have been objected to for the reason set forth on page 3 of the Examiners Office Action letter. As the Examiner will note, claims 1 and 2 have been corrected as suggested by the Examiner and accordingly it is believed that these objections have been eliminated.

Claims 1, and 4-8 have been rejected by the Examiner under 35 U.S.C § 103(a) as being unpatentable over Zhang, U.S. patent 5,757,393 in view of Yasutomi, JP410235860A. Also, claim 3 has been rejected by the Examiner under 35 U.S.C § 103(a) as being unpatentable over Zhang and Yasutomi as applied to claim 1 in further view of Niikawa et al., U.S. Patent 4,866,326. These rejections are respectfully traversed.

The present invention is directed to a method of controlling an ink jet print head containing a substantially closed duct in which ink is situated, in which the duct has at least one exit opening for the ink, wherein an actuation pulse is applied to an electro-mechanical transducer so that the pressure in the duct changes in such a manner that an ink drop is ejected from the exit opening, measuring the electrical impedance of the electro-mechanical inducer during the application of the actuation pulse and adapting the actuation pulse on the basis of the measured impedance.

As the Examiner will note, Claim 1 has been amended to recite that the electrical impedance of the electro-mechanical transducer, real time, during the application of the actuation pulse is measured while keeping the actuation circuit electrically connected to the electro-mechanical transducer. Support for this amendment to claim 1 can be found in paragraphs [0030] and [0031] and figure 2 of the present application.

The Examiner argues that the Zhang patent teaches measuring an electrical signal generated by the transducer and adapting the actuation pulse based on the measured signal. The actuation pulse in the Zhang patent includes a pulse Pp for actually causing ink ejection and separate there from, pulses Pc for damping the pressure in the duct (please see in this regard the Examiner's statement made on page 4, the paragraph directly preceding the figure). The Zhang patent states that when residual pressure is to be detected in the pressure chamber, so that the correct pulse Pc for damping this residual pressure can be generated, the switch signal SS interrupts the analog switch 40, electrically connecting the drive circuit 30 from the Pc electric elements 16 (see columns 7, lines 52-59). Thus, the Zhang patent teaches that while measuring the effect of a pulse, the actuation circuit should be disconnected from the electromechanical transducer. This method, however, has a very significant disadvantage. According to the Zhang method, one can only react to pulses that have been correctly applied. One has to wait to determine what the effect of a pulse is after this pulse is gone and can then try to compensate for unwanted effects by applying a new pulse. According to the present invention, the applicant has developed a method wherein each pulse, on part of a pulse, while it is being applied, can be adjusted to reach the most wanted outcome. Thus, the applicant has developed a method wherein the actuation circuit remains electrically connected to the electro-mechanical transducer while the electrical impedance of the electro-mechanical transducer is being measured real time. This provides the possibility to adjust a pulse at exactly the same moment as it is applied to the transducer. Thus the present method not only provides the opportunity to correct unwanted effects but also to prevent unwanted effects from taking place by timely adjusting pulses while being applied. Please refer to page 4 paragraph [0009] for additional details in this regard.

Because of the deficiencies in the Zhang patent, the Examiner has further relied upon the Yasutomi reference and the Niikawa et al. reference in an attempt to suggest the present invention. However, since neither of these references fill the deficiency in the Zhang patent as pointed out here in above, the further reliance upon these references in an attempt to reject the claims to the present application becomes ineffectual.

Accordingly, in view of the above amendments and remarks reconsideration of the rejections and allowance of all the claims of the present application are respectfully requested.

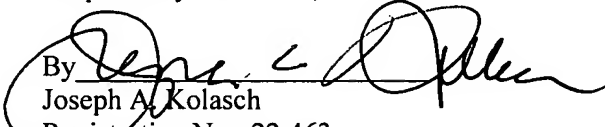
CONCLUSION

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Joseph A. Kolasch (Reg. No. 22,463) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Dated: July 21, 2006

Respectfully submitted,

By 
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Attachments

ANNOTATED SHEET SHOWING CHANGES

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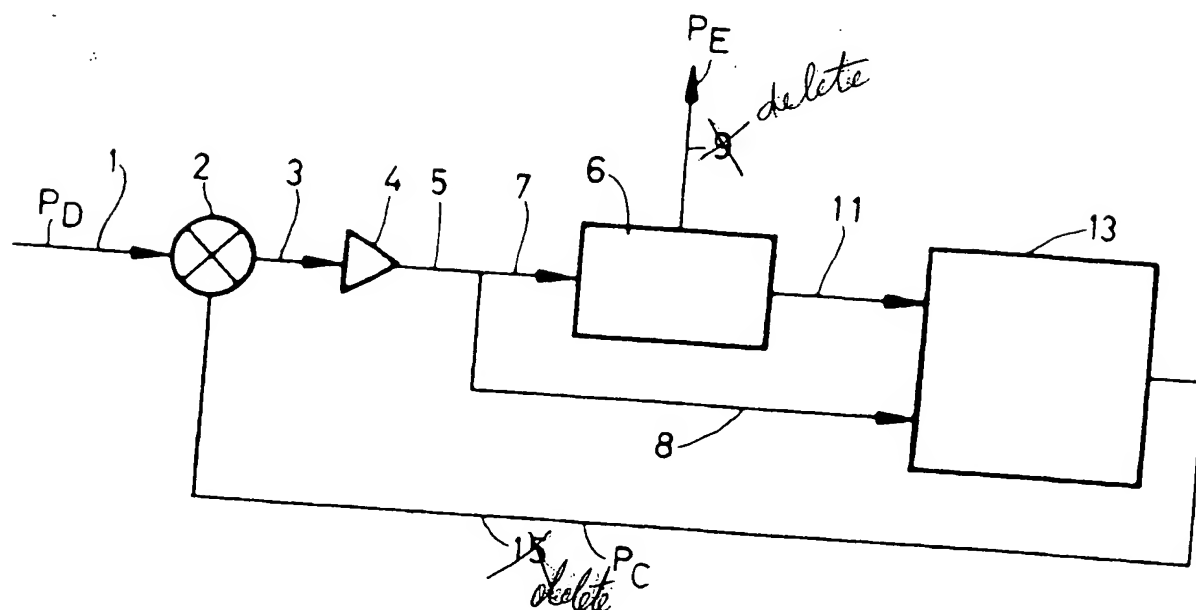


FIG. 1

ANNOTATED SHEET SHOWING CHANGES

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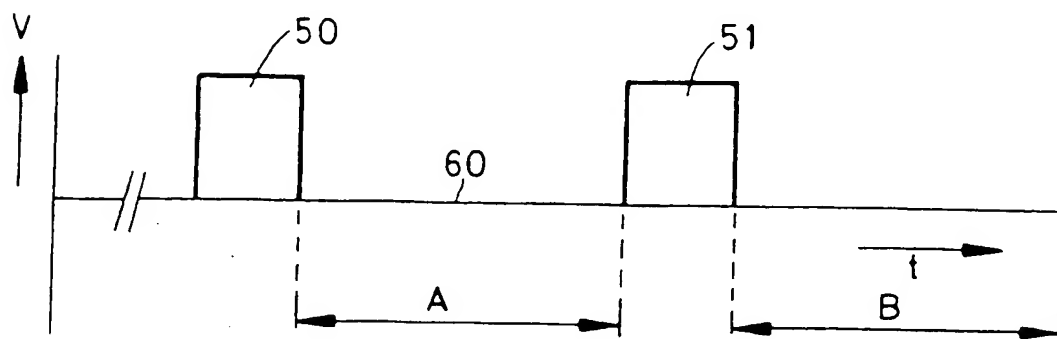


FIG. 4A

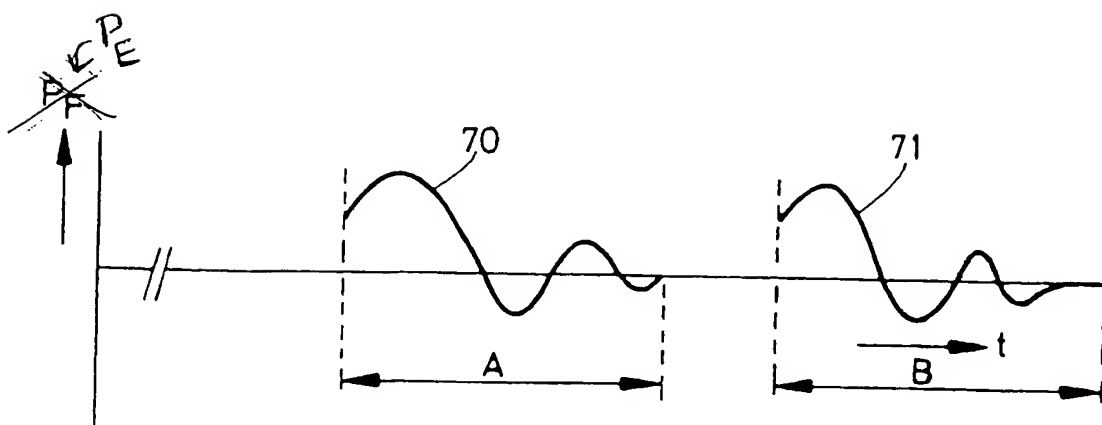


FIG. 4B